indeed, one marked difference between the physical and the intellectual instrumentality. The development of the latter runs far beyond any immediately visible use. The artistic interest in perfecting the method by itself is strong—as the utensils of civilization may themselves become works of finest art. But from the practical standpoint this difference shows that the advantage as an instrumentality is on the side of the intellectual tool. Just because it is not formed with a special application in mind, because it is a highly generalized tool, it is the more flexible in adaptation to unforeseen uses. It can be employed in dealing with problems that were not anticipated. The mind is prepared in advance for all sorts of intellectual emergencies, and when the new problem occurs it does not have to wait till it can get a special instrument ready" (page 149).

ARTICLES IN CURRENT PERIODICALS.

American Oxonian, Concord, N. H., volume 8, no. 1, January, 1921: "The record of the American Rhodes Scholars" by R. W. Burgess, 1–36 [Of the 351 American Rhodes Scholars at Oxford, classes matriculating 1904–1914, 32.7 percent studied law; 17.1 percent modern history and economics; 16.8 percent humanities, including the classics, philosophy, and anthropology; and 6 percent mathematics, physics, chemistry and engineering].

Bulletin of the American Mathematical Society, volume 27, no. 4, January, 1921: "The October meeting of the San Francisco Section" by B. A. Bernstein, 149–153; "An image in four-dimensional lattice space of the theory of the elliptic theta functions" by E. T. Bell, 153–160; "Note on the median of a set of numbers" by D. Jackson, 160–164; "Note on closure of orthogonal sets" by O. D. Kellogg, 165–169; "The mathematical work of Thomas Jan Stieltjes" [review of *Oeuvres complètes de Thomas Jan Stieltjes* (2 volumes, Groningen, 1914–1918)] by R. D. Carmichael, 170–178; Reviews by D. E. Smith of *Opere di Evangelista Torricelli* (edited by G. Loria and G. Vassura, 2 volumes, Faenza, 1919) and of W. W. R. Ball's *An Introduction to String Figures* (Cambridge, 1920), 178–181; Review by C. N. Moore of A. R. Forsyth's *Solutions of the Examples in a Treatise on Differential Equations* (London, 1918), 181–182; Reviews by E. B. Wilson of A. S. Eddington's *Space, Time, and Gravitation; an Outline of the General Relativity Theory* (Cambridge, 1920) and of R. W. Wood's *Researches in Physical Optics* (New York, 1919), 182–186; Notes, 187–193; New publications, 194–196.

Educational Administration and Supervision, volume 6, no. 9, December, 1920: "The scoring of geometry test W" by J. H. Minnick, 509–511.

Hibbert Journal, volume 19, January, 1921: Review by C. D. Broad of A. N. Whitehead's *The Concept of Nature* (Cambridge, 1920), 360–366 [Last paragraph: "The thanks rendered in the preface by Professor Whitehead to the Cambridge University Press officials seem to me excessive. No doubt their hearts are in the right place, but they have passed at least six bad mistakes. On p. 51, l. 4, for *sight* read *touch;* p. 86, l. 8, for *external, eternal;* p. 148, l. 4, for *agree, argue;* p. 155, l. 17, for *sense-object, perceptual object;* p. 180, l. 4, for *universely* (a pleasant conceit!), *inversely;* and on p. 188, l. 9, for *by* read *from.* In conclusion, I must say that anyone who has read *Principles of Natural Knowledge* will find his understanding of that book much improved by reading *The Concept of Nature;* and that anyone who has read neither should go at once to his (or her) bookseller and order both."]

Journal of Philosophy, volume 28, no. 2, January 20, 1921: "Eddington on Einstein" by E. E. Slosson, 48–51 [Last paragraph: "Some mathematicians and physicists have manifested impatience at the impertinent curiosity of the public and declare that Einstein's theory concerns only themselves, and whatever they may decide to do with it can have no possible effect upon anybody's religion, philosophy or view of life. But the public knows better. And Professor Eddington agrees with the majority on this question. Galileo, Newton and Darwin were specialists, speculating in fields remote from common life, yet they have revolutionized the thought and altered the conduct of the world. Einstein's theory is even more fundamental and uncontentional and if it is verified by experiment or generally adopted as a working hypothesis it will be found in the course of time to have a profound influence upon the minds of men outside of the realm of science."]

Journal of the United States Artillery, volume 51, December, 1919: "Charts for the calculation of the effect of small changes in the elements of fire" by P. L. Alger, 585–603—Volume 53, August, 1920: "Two misconceptions" by R. S. Hoar, 179–181—October: "On weighting factor curves for flat fire" by J. F. Ritt, 404–410—December: "Wind weighting factors" by J. J. Johnson, 578–587; "Mirror and window position finders" by W. C. Graustein, 588–610.

MATHEMATICAL GAZETTE, volume 10, January, 1921: "Unicursal plane curves" by G. B. Mathews, 193–194; "The lighter side of mathematics" by C. A. Stewart, 195–200 ["In our profession we often come into contact with those who do not understand Pure Mathematics. Some of these are respectful as if entering a shrine; but others, of the baser sort, are contemptuous. My object in this paper is to consider the position of the mathematician in two of his possible moods—during his moments of leisure and during his moments of reflection]; "Gleanings far and near," 200, 219; "The tracing of conics" by E. H. Neville, 201–203; "An odd method for determining the year of birth" by G. A. Miller, 208–209; "Lagrange's tribute to Maclaurin" by C. Tweedie, 209; "Note on the differentiation of sin x, and on the limit of $(\sin x)/x$ as x tends to zero" by C. H. Hardingham, 212–215. [G. A. Miller's note[1]: "In the second edition of Cajori's *History of Mathematics*, 1919, page 330, there appears an interesting biographical sketch of Augustus De Morgan, the second sentence of which is as follows: 'For the determination of the year of his birth (assumed to be in the nineteenth century) he proposed the conundrum, "I was x years of age in the year x^2."' It may be of interest to note that after the year 1936 the conditions here given are insufficient to determine the year of birth of DeMorgan, since

$$1806 + 43 = (43)^2 \text{ and } 1892 + 44 = (44)^2.$$

"Perhaps the interest in the given remark, which is said[2] to have been made by DeMorgan, is enhanced by the observation that in every later century there is no more than one year, such that by adding an integer x to it there results a sum which is equal to x^2. For instance, if a man born in the twentieth century will be x years old in the year x^2, he must be born in 1980, since

$$1980 + 45 = (45)^2.$$

"For the twenty-first and twenty-second centuries the corresponding years are 2070 and 2162 respectively, since

$$2070 + 46 = (46)^2 \text{ and } 2162 + 47 = (47)^2.$$

"The thirty-third century is the first century which does not contain a year such that if you add x to it you obtain the year x^2, and the fifteenth century is the next to the nineteenth in which there are two such years; viz: 1406 and 1482, since

$$1406 + 38 = (38)^2 \text{ and } 1482 + 39 = (39)^2.$$

"These very elementary observations tend to show that if DeMorgan made the said remark it does not exhibit his usual thoughtfulness and accuracy."] [C. Tweedie's note: "In the recent work by Professor Cajori on the *History of the Conceptions of Limits and Fluxions in Great Britain from Newton to Woodhouse*, the author preludes his remarks upon Colin Maclaurin's *Treatise of Fluxions* with the following statement:

"'Maclaurin's book on fluxions has been considered the ablest and most rigorous text of the eighteenth century. It was pronounced by Lagrange, 'le chef d'oeuvre de géométrie qu'on peut comparer à tout ce qu'Archimède nous a laissé de plus beau et de plus ingénieux.''

"And there is a footnote '*Mém. de L'Acad. de Berlin*, 1773; quoted in the art. Maclaurin in Sidney Lee's *Dict. of National Biography*.'

"The statement by Lagrange occurs in his memoir, 'Sur l'attraction des Sphéroides Elliptiques' (*Mém. de L'Acad. de Berlin*, 1773, p. 121).

"Here is the passage: 'M. Maclaurin qui a le premier résolu ce problème dans son excellent Pièce sur le flux et reflux de la mer, couronnée par l'Académie des Sciences de Paris en 1740, a suivi une méthode purement géométrique, et fondée uniquement sur quelques propriétés de l'ellipse et des sphéroides elliptiques: et il faut avouer que cette partie de l'ouvrage de M. Maclaurin est un chef-d'oeuvre de Géométrie qu'on peut comparer à tout ce qu'Archimède nous a laissé de plus beau et de plus ingénieux.'

"Clearly this has nothing whatever to do with the *Treatise of Fluxions* of Maclaurin, and it is most unfortunate that such a sublime appreciation of the work of one great mathematician by another should be so cruelly misapplied by two such eminent authorities. There may have been confusion in the mind of the earlier writer for the *D.N.B.* between *flux* and *fluxion*, but such an excuse cannot be tendered for a scholar of Professor Cajori's standing.

[1] The gist of this note appeared in *School and Society*, August 7, 1920. Cf. this MONTHLY, *1920*, 476.

[2] "[v. *Budget of Paradoxes*, p. 332; 2nd ed., p. 124, vol. ii. All that DeMorgan says is, 'I was x years old in A.D. x^2'; not 4 in A.D. 16, nor 5 in A.D. 25, but still in one case under that law.]"

"The passage from Lagrange is correctly quoted in the *Life of Maclaurin* published in the *Mathematical Gazette*, October 1916, and is to be found also in Chasles' *Aperçu Historique*.

"Maclaurin was, of course, 'the creator of the theory of the attraction of ellipsoids.'"]

MATHEMATICS TEACHER, volume 14, no. 1, January, 1921: "The National Council of Teachers of Mathematics" by C. M. Austin, 1–4; "Progress of the National Committee on Mathematical Requirements" by J. W. Young, 5–15; "Junior high school mathematics: A discussion of the National Committee Report" by C. B. Walsh, E. R. Breslich, W. Betz, Marie Gugle, R. Schorling, 16–41; "First lessons in demonstrative geometry" by M. J. Newell and G. A. Harper, 42–45; Editorials, News and Notes, Questions and Answers, Book Reviews, 46–54.

MESSENGER OF MATHEMATICS, volume 50, nos. 2 and 3, June and July, 1920: "4-tic & 3-bic residuacity-tables" (continued) by A. Cunningham and T. Gosset, 17–30; "On plane curves of degree n with tangents of n-point contact (second paper)" by H. Hilton, 31–40; "On Laplace's theorem of simultaneous errors" by L. V. Meadowcroft, 40–48—No. 4, August: "Four-vector algebra and analysis (part II)" by C. E. Weatherburn, 49–61; "On a Diophantine problem (third paper)" by H. Holden, 62–64.

NATURE, volume 106, December 23, 1920: Review of E. T. Whittaker and G. N. Watson's *A Course of Modern Analysis* (3d edition, Cambridge, 1920), 531—December 30: "Mathematics in secondary education" [in the United States], 583–584—January 6, 1921: "Nomography" [review of S. Brodetsky's *A First Course in Nomography* (London, 1920)], 593–594—January 13: "The Mathematical Association" by C. G., 644–645—January 20: "General dynamics" by A. Gray, 655–656 [Review of Lamb's *Higher Mechanics* (Cambridge, 1920)]; "The history of determinants" by G. B. M., 658 [Review of Muir's *The Theory of Determinants*, vol. 3 (London, 1920)]; "The mechanics of solidity" by J. Innes, 662–663; "Measurements of the angular diameters of stars" by A. C. D. C., 676–677; "The late Srinivasa Ramanujan" by E. H. Neville, 661–662 [Last two paragraphs: "Ramanujan walked stiffly, with head erect, and his arms, unless he was talking, held clear of his body, with hands open and palms downward. In conversation he became animated, and gesticulated vividly with his slender fingers. He had a fund of stories, and such was his enjoyment in telling a joke that often his words struggled incomprehensible through the laughter with which he anticipated the climax of a narrative. He had serious interests outside mathematics; he was always ready to discuss whatever in philosophy or politics had last caught his attention, and Indians speak with admiration of a mysticism of which his English friends understood little.

"Perfect in manners, simple in manner, resigned in trouble and unspoilt by renown, grateful to a fault and devoted beyond measure to his friends, Ramanujan was a lovable man as well as a great mathematician. By his death I have suffered a personal loss, but I do not feel that his coming to England is to be regretted even for his own sake. Prof. Hardy speaks of disaster because of the hopes he entertained. If he pictures Ramanujan as he might have been throughout a long life, tormented by a lonely genius, unable to establish effective contact with any máthematicians of his own class, wasted in the study of problems elsewhere solved, Prof. Hardy must agree that the tragedy averted was the greater. Shortly before he left England, at a time of great depression, Ramanujan told me that he never doubted that he did well to come, and I believe that he would have chosen as he did in Madras in 1914 even had he known that the choice was the choice of Achilles."]

NOUVELLES ANNALES DE MATHEMATIQUES, volume 79, December, 1920: "Charles-Ange Laisant (1841–1920)" by R. Bricard, 449–454; "Étude des surfaces de translation de Sophus Lie" (suite et fin) by B. Gambier, 454–479; "Sur certaines relations qui existent entre l'épicycloide et l'hypocycloide à trois rebroussements" by J. A. Moren, 479–484; "Considérations sur le frottement de glissement" by E. Delassus, 485–496; "Note géométrique sur une généralisation du théorème de composition des vitesses et le théorème de Coriolis" by L. Pomey, 496–501; "Table des matières par ordre méthodique," 503–507.

PHILOSOPHICAL REVIEW, volume 30, January, 1921: "Dr. Whitehead's theory of events" by D. S. Robinson, 41–56 [First paragraph: "Dr. Whitehead has rightly said: 'It is a safe rule to apply that, when a mathematical or philosophical author writes with a misty profundity, he is talking nonsense.' [1] Now much of his own writing is assuredly impervious to this criticism, being crystal-clear as well as genuinely profound. But does not his singular and noteworthy theory of events, as recently expounded in his *Enquiry concerning the Principles of Natural Knowledge*,

---

[1] "*Introduction to Mathematics*, p. 227."

supply suitable material for the application of this 'safe rule'? If, as Dr. Whitehead claims, events are the ultimate facts of nature and the ultimate data of science, it is manifestly important that philosophers should have accurate and clear knowledge of what an event is. But a careful study of his account has convinced me that it is needlessly abstruse and nebulous, indeed, filled with what may well be called misty profundity. The attempt to substantiate this contention involves a somewhat minute examination of that part of his exposition setting forth his conception of an event."]

PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, volume 6, no. 10, October, 1920: "Motion on a surface for any positional field of force" by J. Lipka, 621–624.

REVUE GÉNÉRALE DES SCIENCES PURES ET APPLIQUÉES, volume 31, December 15, 1920: Review by C. Maillard of Karpinski, Benedict and Calhoun's *Unified Mathematics* (Boston, 1920), 765.

REVUE PHILOSOPHIQUE DE LA FRANCE ET DE L'ETRANGER, volume 89, March–April, 1920: "Les idées de temps, de durée et d'éternité dans Descartes" by J. Vigier, 196–223—May–June: "Les idées de temps etc." (suite) by J. Vigier, 312–348—Volume 90, November–December: "Un savant français: Henri Poincaré" by A. Denjoy, 321–350 [First paragraph: "Quand Poincaré mourut en 1912 à l'âge de cinquante-neuf ans, il laissait une oeuvre immense, dont le mérite recueillait le suffrage unanime des représentants de toutes les catégories du savoir qui empruntent aux mathématiques une aide indispensable. Le nombre de ses notes, articles, mémoires parus dans des publications périodiques réservées à la science, approchait 500. De grands ouvrages de mécanique céleste, quatorze volumes de Physique mathématique, et enfin,—originalité lui conférant une place unique parmi tous les grands mathématiciens des deux derniers siècles,—trois volumes philosophique s'ajoutaient, pour en accroître notablement l'importance, aux pièces fragmentaires déjà signalées. Et l'on ne doit point s'imaginer que cette énorme masse de text sortie de la plume de notre savant, se fût artificiellement enflée par la prolixité de son auteur. Les lectures de Poincaré qui porteraient de ce point de vue un jugement sur son oeuvre, ne songeraient pas précisement à lui adresser ce reproche-là. L'expression est tout juste suffisamment étendue pour déterminer sans aucune équivoque le sens de la pensée. Selon la bonne règle française, il ne demeure pas un seul membre de phrase dont la disparition trouverait suppléance dans le texte restant. Cette production formidable d'écrits représente uniquement une somme incompressible d'idées dont l'éclusion ne pouvait se dérouler que dans l'un des cerveaux les plus fertiles de tous les temps."]; "Descartes et Harve" (à suivre) by E. Gilson, 432–458.

SCHOOL SCIENCE AND MATHEMATICS, volume 21, no. 1, January, 1921: "Minimum high school mathematics" by F. Cajori, 25–28 [First paragraph: "A pupil permitted to graduate from a high school without any mathematics is in danger of remaining the unenvied occupant of a blind alley. The attempt to reduce the minimum high school course in mathematics to one year is unwise, because thus far experience shows that one year is too short a time for a pupil to acquire a knowledge of elementary mathematics that can be applied in practical life. Two years would seem to be a better minimum."]; "The first month of geometry" by J. A. Nyberg, 29–36; "High school and college mathematics" by T. E. Mason, 37–44; Problem department, 83–86—February: "The teaching of graphs" by J. A. Nyberg, 144–149; "Tests of mathematical ability and their prognostic values. A discussion of the Rogers tests" by L. E. Mensenkamp, 150–162; Problems and solutions, 173–177.

SCIENCE, new series, volume 53, January 14, 1921: "Romancing in science" by D. W. Horn, 44 [With reference to F. Cajori's communication listed in this MONTHLY, *1921*, 138 (see also contents of *Science*, *1921*, 35)]—January 28: "Musical notation" by T. P. Hall, 91–92 [First paragraph: "To the Editor of *Science*: In the September number of *The Scientific Monthly* Professor E. V. Huntington describes a new way of writing music [cf. this MONTHLY, *1921*, 35], which for simplicity and clearness can hardly be surpassed. It consists in using the ordinary staff for the twelve notes of the tempered chromatic scale, instead of (as now done) for the seven notes of the diatonic scale. This new 'normalized' notation does away with all sharps and flats. Since there are just twelve lines and spaces (including the added line below) in each staff, each letter will have always the same position on the staff, whether soprano, alto, tenor or bass. It is hoped that teachers will take advantage of the normalized notation to smooth out the road for beginners, particularly in the grade schools."]; "Star-time observations with an engineer's Y-level" by W. J. Fisher, 94–95—February 4: "The biographical directory of American men of science" by J. McK. Cattell, 118; Review by L. S. Marks of F. Bedell's *The Airplane* (New York, 1920), 119–120; "The Washington conference on the history of science" by L. Thorndike, 122 [First

paragraph: "The conference upon the History of Science, initiated by the American Historical Association at its annual meeting a year ago in Cleveland, proved such a success that the program committee devoted another session to the subject this December at Washington. Simultaneously the History of Science Section, which has recently been formed under the auspices of the American Association for the Advancement of Science, was meeting in Chicago, thus demonstrating the widespread interest in this promising field. This widespread interest was further evidenced at Washington by the variety of learned occupations represented by the speakers, who included, in addition to professors of science and history, a librarian, a college president, and the head of an institution for research."]—February 11: "Reply to Professor Horn" [see above] by F. Cajori, 139.

Science Progress, volume 15, January, 1921: "The $\sqrt{-1}$: a protest" by "Amateur," 456–457 [First few sentences: "Probably modern mathematics differs from past mathematics chiefly in the stress which is now laid upon 'Complex Numbers.' When algebra was first invented numbers were conceived to be signless; then gradually the so-called negative numbers were introduced; then mathematicians went on to separate rational from irrational numbers; and now their pupils are obliged to twist their brains by the consideration of complex numbers. Every book one reads nowadays commences with a series of paragraphs on these different kinds of numbers, and the reader is often obliged to generalize the simplest functions in terms of the last mentioned. Is there really any advantage in all this? And, though I am only an amateur, I should like to maintain that there is no such advantage, and, moreover, that complex numbers do not exist at all—though I am aware that such a statement will expose me to adverse or even contemptuous criticism. To begin with, it may be of course even doubted whether there are such things as negative numbers—and this doubt has been frequently expressed by the greatest experts. Negativeness is not a property of number itself but merely an expression of the fact that a number has been subjected to the inverse operation of addition."]; Review by R. R[oss] of Cajori's *History of the Conceptions of Limits and of Fluxions in Great Britain from Newton to Woodhouse* (London, 1919), 486–487.

Scientific American, volume 123, September 18, 1920: "New concepts of the past century. The change in outlook since classical days, which makes non-Euclidean geometry a possibility" by the Einstein Prize Essay Editor, 276, 286, 288.

Scientific Monthly, volume 12, no. 1, January, 1921: "On the character of primitive human progress" by R. D. Carmichael, 53–61 [First and last paragraphs: "The most remarkable thing among natural processes is the unfolding of the intellect and moral nature of man. Since his emergence from the animal state he has possessed powers comparable to those which he now manifests. Neither history nor speculation can reveal a period in his development when he was not making conquests evincing the same high order of intelligence as that which marks even his later career. In the earliest stages the individual man or the small group in a roving tribe had to approach the problems of life and environment without any effective tradition to guide or sympathetic collaboration with others to inspire. This called for a measure of independence unlike anything manifested by individuals today except in the labors of men of dominating genius. Among ruder peoples, in early times and at the present, the remarkable character of the discovery of truth is signalized by the acceptance of the new vision as something supernormal and sacred, akin to the activity of the gods and directly inspired by them. Though we have ceased to refer it to the supernatural, we ourselves understand it but little better. . . . We may take pleasure in such ancestors as our forefathers showed themselves to be even in the periods of savagery and barbarism through which we have rapidly sketched their development. They stood in the presence of phenomena whose nature was awe-inspiring to the creature that first inquired concerning their meaning. With no traditions to assist, with no previous conquests or discoveries of truth to start them out, with only a dumb and undeveloped sense of instinct of the destiny of man to light the way into a darkness of ignorance more profound perhaps than we can conceive today when so much of the push of the past has already been realized in our individual lives before we come to contemplate philosophically the nature of our environment and our relation to it, they began a career of development to which nothing else in our ken is to be compared."]; "The group-theory element of the history of mathematics" by G. A. Miller, 75–82 [First two paragraphs: "Few mathematical terms suggest such fundamental human cravings as the term group, and few have been more appropriately chosen. Just as human society has led to perplexities which increased with the advance of civilization, so the mathematical group-theory has given rise to problems which became more and more difficult with the advances in the development of mathematics. In both cases the primitive stages are comparatively simple and their history throws important light on the later developments.

"The history of the mathematical group-theory can be conveniently divided into three periods. The first of these extends from the beginning of mathematical history to about 1770 A.D., and may be called the *implicit period* since the group concept was then employed without being explicitly stated. The second, or *specialization period*, extends from about 1770 to about 1870. During this period the theory of substitution groups was founded as an autonomous science and the usefulness of this theory in the study of algebraic equations was emphasized. The third, or *generalization period*, extends from about 1870 to the present day, and is characterized by increased generalizations by abstraction and the explicit use of groups in each of the large domains of mathematics."]

Tohôku Mathematical Journal, volume 18, nos. 3 and 4, December, 1920: "On continuous sets of points, II" (continued) by K. Yoneyama, 205–255; "On the separation theorem for the integrals of the differential equation of the third order" by K. Ôishi, 256–260; "On the distribution of electricity on two mutually influencing spheroidal conductors" by B. Datta, 261–267; "Sur quelques propriétés relatives à certains polygones inscrits à une circonférence" by V. Thébault, 268–272; "On some characteristic properties of curves and surfaces" by S. Nakajima, 272–287; "A note on the closed convex surface" by K. Ôishi, 288–290; "An application of the orthogonal trajectory to a problem of singular solutions of ordinary differential equations of the first order" by T. Matsumoto, 291–294; "On the integral $\int_0^\pi e^x \cos r\theta \sin q\theta, \cos q\theta\, d\theta$" by T. Takeuchi, 295–296; "Über lineare Gleichungen mit unendlich vielen Variabeln" by T. Kubota, 297–301; "Akiyuki Kemmochi and his 'Equal circles on the sphere'" [in Japanese] by T. Hayashi, 302–308; "Some formulas in the theory of interpolation of many independent variables" by S. Narumi, 309–321; "On the use of a table of double entry" by T. Hayashi, 322–326; "Shorter notices and reviews, Miscellaneous notes," 327–338.

Transactions of the American Mathematical Society, volume 22, no. 1, January, 1921: "Arithmetical paraphrases" by E. T. Bell, 1–30; "The construction of algebraic correspondences between two algebraic curves" by V. Snyder and F. R. Sharpe, 31–40; "Concerning certain equicontinuous systems of curves" by R. L. Moore, 41–55; "Fundamental systems of formal modular seminvariants of the binary cubic" by W. L. G. Williams, 56–79; "A property of two $(n+1)$-gons inscribed in a norm-curve in n-space" by H. S. White, 80–83; "Recurrent geodesics on a surface of negative curvature" by H. M. Morse, 84–100; "On the location of the roots of the jacobian of two binary forms, and of the derivative of a rational function" by J. L. Walsh, 101–116; "On functions of closest approximation" by D. Jackson, 117–128.

Transactions of the Royal Society of South Africa, Cape Town, volume 8, 1920, part 2: "Note on unimodular and other persymmetric determinants" by T. Muir, 95–101; "Note on certain determinant identities arrived at by H. v. Koch" by T. Muir, 101–105—Part 3: "Note on a sum of products which involves symmetrically the nth roots of 1" by T. Muir, 173–178; "Additional note on the resolvability of the minors of a compound determinant" by T. Muir, 229–233—Part 4: "Second note on the determinant of the sum of two circulant matrices" by T. Muir, 293–296.

PROBLEMS AND SOLUTIONS.

Edited by B. F. Finkel and Otto Dunkel.

Send all communications about Problems and Solutions to B. F. FINKEL, Springfield, Mo.

PROBLEMS FOR SOLUTION.

[N.B. The editorial work of this department would be greatly facilitated if, on sending in problems, the proposers would also enclose their solutions—*when they have them*. If a problem proposed is not original the proposer is requested *invariably* to state the fact and to give an exact reference to the source.]

2896. Proposed by the late L. G. WELD.

A circle is inscribed within a triangle. In each of the three spandrels between this circle and the vertices another circle is described; in each of the three spandrels between these last circles